

# UK Patent Application (19) GB (11) 2 143 444 A

(43) Application published 13 Feb 1985

(21) Application No 8409251

(22) Date of filing 10 Apr 1984

(30) Priority data

(31) 8320470 (32) 15 Jul 1983 (33) DE

(51) INT CL<sup>3</sup>  
B03B 5/42

(52) Domestic classification  
B2H 3

(56) Documents cited  
None

(58) Field of search  
B2H

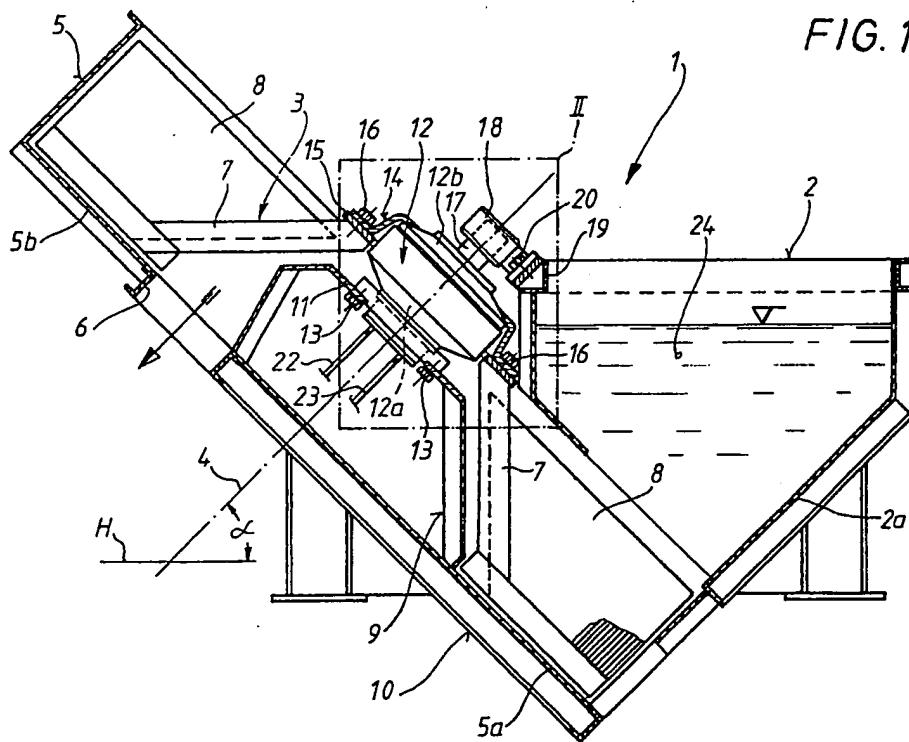
(71) Applicant  
Krupp Polysius AG (FR Germany),  
Graf-Galen-Str 17, D—4720 Beckum, Federal Republic  
of Germany

(72) Inventor  
Heinz Rasch

(74) Agent and/or Address for Service  
George Fuery & Co., Whitehall Chambers, 23 Colmore  
Row, Birmingham B3 2BL

## (54) Inclined wheel separator

(57) In a single-float separator comprising a separating vessel (2) from which a heavy fraction is lifted by an inclined bucket wheel (3), the rotary drive for the wheel is formed by a hydraulic motor (12) with the wheel flanged directly as at (14) onto the rotor (12b) thereof. This results in a simple construction, energy-saving drive and an optimum adaptability to the bucket wheels necessary at any one time.

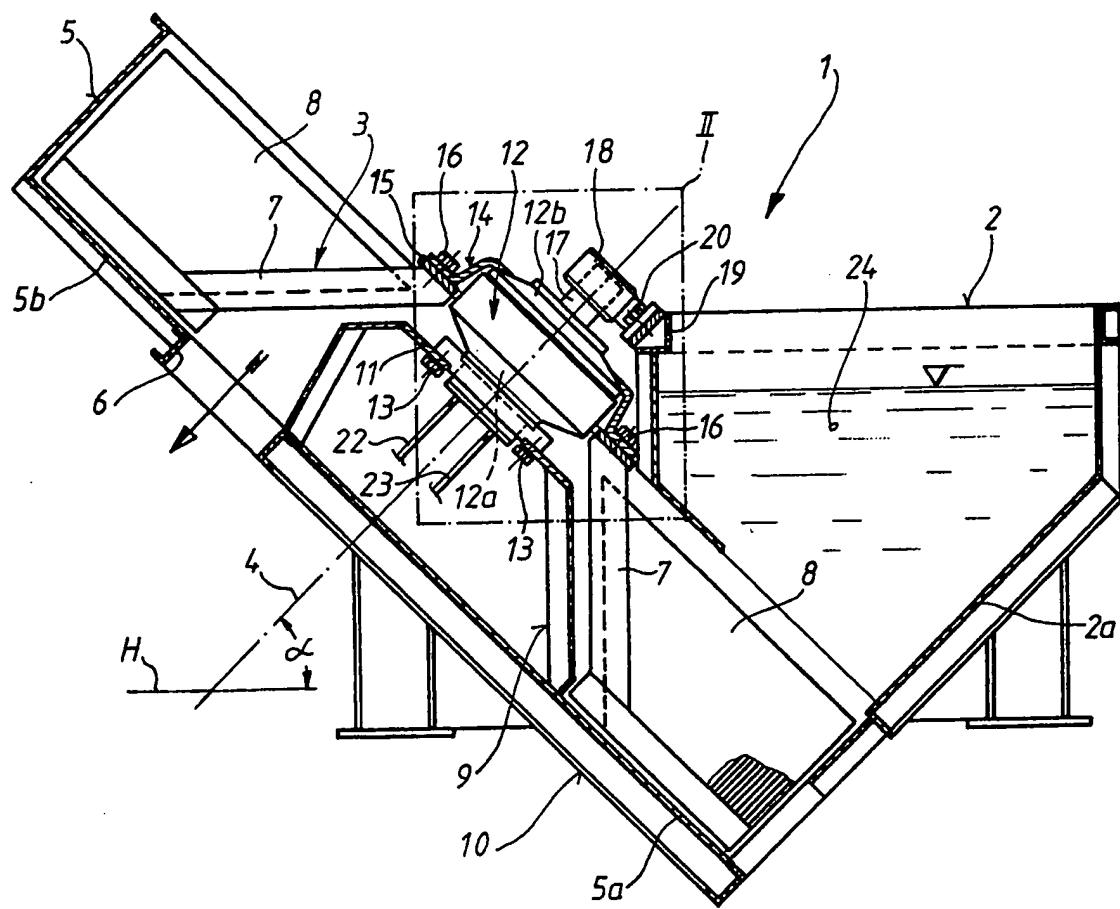


GB 2 143 444 A

2143444

1/2

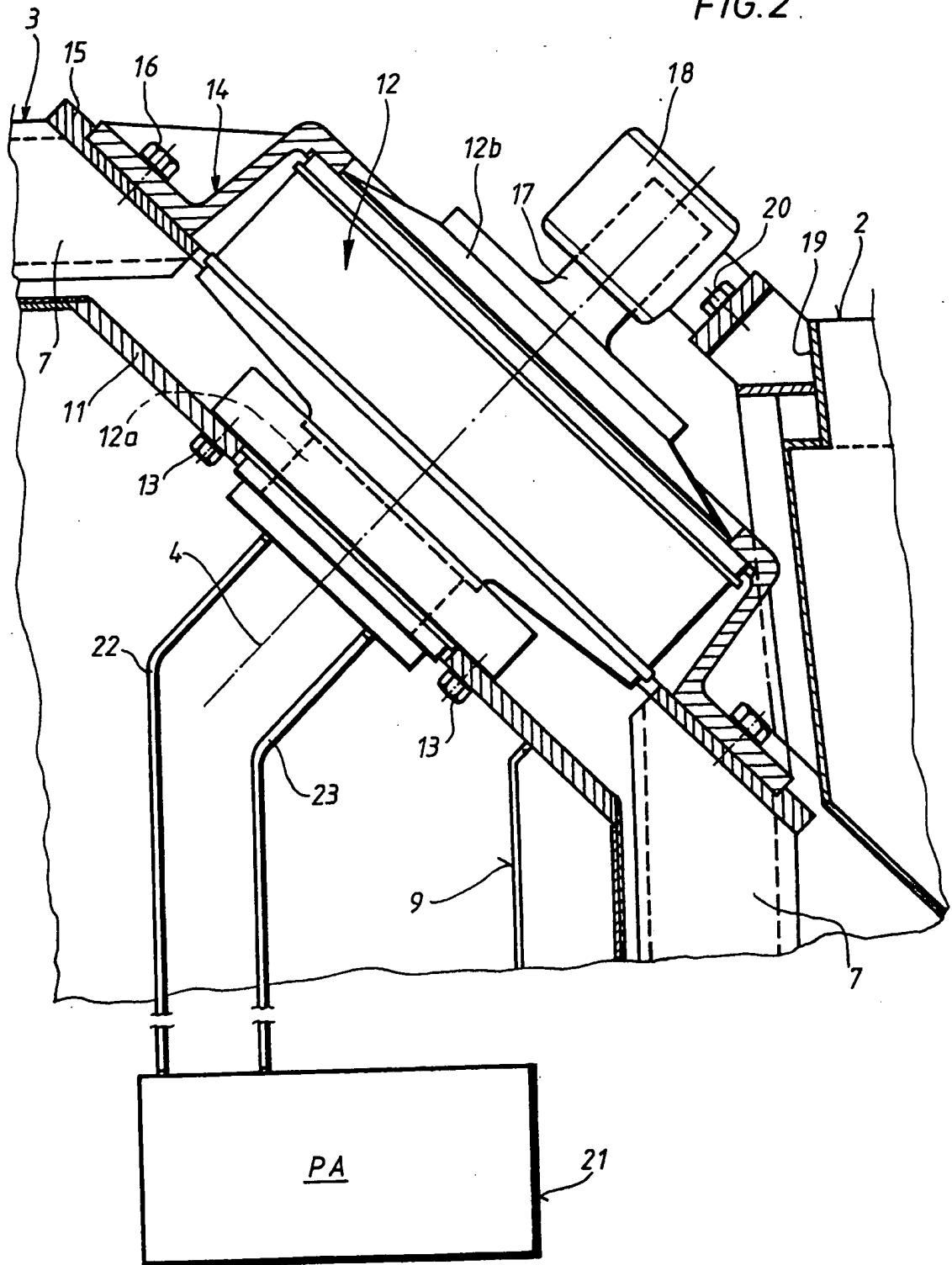
FIG. 1



2143444

2/2

FIG. 2.



**SPECIFICATION**  
**Inclined wheel separator**

The invention relates to an inclined wheel separator according to the preamble to claim 1.

5 The inclined wheel separator belongs quite generally to the group of sink-float separators in which a mixture of loose material, especially a mixture of minerals, is broken down into two fractions with the aid of a separating fluid, in which 10 parts of the mixture having a lower specific weight than the fluid float in the upper part of this fluid and are discharged as floating material, whilst the parts of the mixture with a higher specific weight than the separating fluid sink downwards and are discharged 15 from the separating vessel as sediment with the aid of a bucket wheel. In the present case the bucket wheel is arranged within the separating vessel with its axis running at an angle.

20 Constructions are known in the art in which the bucket wheel has a driving collar which is connected so as to be fixed against rotation to a drive shaft mounted in roller bearings. In order to drive this shaft an electric motor is provided which acts by means of a V-belt drive on a reduction gear which is 25 connected either directly as a slip-on gear or by means of a claw coupling to the said drive shaft of the bucket wheel. This drive can be provided both on the lower end and on the upper end of the shaft; however, in either case it involves high construction 30 costs.

35 In the dimensioning and rate of rotation of the bucket wheel care must be taken to ensure that this is designed for the maximum possible quantity of sediment, although — because of modern separation methods — this frequently only occurs for a short time, whilst the bucket wheel is only partially utilised for the rest of the time.

40 The object of the Invention is to provide an inclined wheel separator of the type described above which is distinguished above all by a construction in particular of the bucket wheel which is greatly simplified by comparison with the known constructions, by an energy-saving drive and by an optimum adaptability to the bucket wheel capacities necessary at any time.

45 This is achieved according to the invention in that the rotary drive is formed by a hydraulic motor, the bucket wheel being flanged directly onto the rotor thereof.

50 As is generally known and therefore no further explanation is required, by relatively simple construction a hydraulic motor can be continuously variable within wide limits both in its capacity and in its rate of rotation (speed) simply by regulating the quantity of hydraulic fluid and thus can be simply and rapidly adapted to the prevailing circumstances.

55 Simply by using the hydraulic motor according to the invention in place of an electric motor with reduction gear and connection arrangements a quite marked simplification in particular of the drive and construction of the bucket wheel of such an inclined wheel separator can be achieved by comparison with the known constructions described above. This greatly simplified construction of the

65 bucket wheel and its drive also results in markedly easier installation and removal of the drive or the drive unit.

70 Further details and advantages of the invention are set out in the following description of an embodiment which is illustrated in the drawings. In the drawings:

75 Figure 1 shows a vertical section through the inclined wheel separator;

Figure 2 shows an enlarged portion (detail II in Figure 1) of the drive of the bucket wheel.

80 The general functional construction of the inclined wheel separator 1 shown in Figure 1 should be largely known, and therefore only those parts which are necessary for explanation of the invention will be described.

85 The inclined wheel separator 1 contains a stationary separating vessel 2, the lower part 2a of which is constructed in a conventional manner in the shape of a funnel. A bucket wheel 3, the axis of rotation 4 of which is inclined and therefore forms an acute angle  $\alpha$  with the horizontal H, is rotatably mounted on the side of the separating vessel 2 so that the whole bucket wheel 3 is arranged at an angle — as shown in Figure 1 — and the peripheral section thereof which is lower at any time extends into the lower part 2a of the separating vessel 2 and actually fits into the lower corner region thereof.

90 This inclined bucket wheel 3 rotates in a bucket wheel housing 5 which is also inclined and is approximately adapted in position and shape to the bucket wheel 3. In its lower section 5a this housing 5 passes into the lower part 2a of the separating vessel 2 and is in open communication therewith the latter. In the region of its upper section 5b the bucket wheel housing 5 has a sediment discharge opening 6.

95 The bucket wheel 3 can be constructed in a conventional manner with axial-radial spoke-like struts 7 and radial vanes 8 supported thereon which 100 can be of grid-like construction (slotted grid) or can be perforated, as is known *per se*.

105 A stationary support structure 9 which at the same time forms an inner limit in the bucket wheel housing 5 and a mounting support for the bucket wheel rotary drive which has yet to be explained is 110 also arranged inside the bucket wheel 3. The separating vessel 2, the bucket wheel housing 5 and the support structure 9 are arranged on a common stationary frame 10 of the inclined wheel separator

115 1. The support structure 9 has a mounting plate 11 as an upper cover on which the stationary shaft 12a of a hydraulic motor 12 is arranged and fixed by screws 13 which are merely indicated. This

120 hydraulic motor 12 serves as a rotary drive for the bucket wheel 3. For this purpose the hydraulic motor housing 12b which essentially forms the rotor of the hydraulic motor 12 is flanged directly onto a central ring part 15 of the bucket wheel 3 with the aid of a collar-like flange connection 14 and with the aid of screws 16 which are indicated in the drawing.

125 The upper end of the hydraulic motor housing 12b is provided with a stub shaft 17 by means of which the housing 12b is additionally mounted in an auxiliary

bearing 18 provided above the bucket wheel 3. This auxiliary bearing 18 is supported by a frame 19 which — as shown in Figure 1 — encloses the upper region of the separating vessel 2. Naturally, the

5 Inclination of the hydraulic motor 12 with the housing 12b and the stub shaft 17 corresponds to the inclination of the axis of rotation 4 of the bucket wheel 3; in a corresponding manner the auxiliary bearing 18 is also retained at an angle on the frame

10 19 and is preferably fixed there with the aid of screws 20 which are indicated. The additional provision of the auxiliary bearing 18 ensures reliable guiding and retention of the hydraulic motor 12 and thus the whole bucket wheel arrangement 3. The screw connections with the screws 13, 16 and 20 make installation and removal of the hydraulic motor 12 (e.g. for maintenance purposes) simple, and the bucket wheel 3 can remain in place.

15 20 A pump assembly which is constructed in a conventional manner and comprises as is known *per se* a hydraulic fluid feed pump, an arrangement for continuous variation of the motor speed and corresponding throttles, valves and a hydraulic fluid storage tank can be associated with the hydraulic motor 12. This pump assembly is merely indicated quite schematically at 21 in Figure 2. Inside the support structure 9 hydraulic leads 22, 23 (merely indicated schematically in Figure 2) which are

25 30 connected to the pump assembly 21 are connected to the underside of the hydraulic motor 12. By means of the construction according to the invention of the bucket wheel separator 1, and in particular by means of the construction and arrangement of the bucket wheel drive thereof, it is possible to achieve not only simplification of the construction and optimum adaptability to the bucket wheel capacity at any one time but also a considerable energy saving and a reduction in the

35 40 wear on the bucket wheel overall.

Since — as already mentioned above — it is recognised that the separating function of such an inclined wheel separator is generally known, for the

sake of simplicity the parts of the apparatus which are known *per se* and are necessary for the general function (e.g. inlets and outlets, discharge paddles for floating material, etc.) are not shown and illustrated in greater detail. Equally any suitable fluid (turbid fluid) can be used as a separating fluid

45 50 24 in the separating vessel 2.

**CLAIMS**

1. Inclined wheel separator, comprising
  - a) a stationary separating vessel,
  - b) a rotatable bucket wheel arranged at an angle
  - 55 c) a rotary drive for the bucket wheel, characterised in that
    - d) the rotary drive is formed by a hydraulic motor (12), the bucket wheel (3) being flanged directly onto the rotor (12b) thereof.
2. Inclined wheel separator as claimed in claim 1, characterised in that the stationary shaft (12a) of the hydraulic motor (12) is arranged on a stationary support structure (9) provided inside the bucket
- 65 60 65 wheel (3) and the rotating housing (12b) of the hydraulic motor which essentially forms the rotor is additionally mounted in an auxiliary bearing (18) provided above the bucket wheel (3).
3. Inclined wheel separator as claimed in claim 2, 70 characterised in that the separating vessel (2) and the support structure (9) are arranged on a common stationary frame (10) and the auxiliary bearing (18) for the rotor (12b) of the hydraulic motor (12) is supported by a frame (19) enclosing the upper
- 75 75 region of the separating vessel.
4. Inclined wheel separator as claimed in claims 1 and 3, characterised by screw connections between the hydraulic motor shaft (12a) and the support structure (9), the rotor (12b) of the hydraulic motor
- 80 80 85 and the bucket wheel (3) as well as the auxiliary bearing (18) and the frame (19) of the separating vessel (2).
5. Inclined wheel separator substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.